STEVAL-TDR020V1

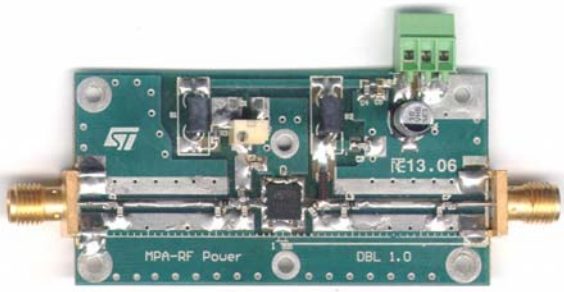
Portable UHF 2-way radio demonstration board based on the PD84006L-E

Features

- Excellent thermal stability
- Frequency: 740 - 950 MHz
- Supply voltage: 7.2 V
- Output power: 4 W
- Power gain: 12.3 ±0.3 dB
- Efficiency: 50 % - 57 %
- Load mismatch 20:1
- BeO free amplifier

Description

The STEVAL-TDR020V1 demonstration board is a portable UHF 2-way radio designed as a platform for evaluating the performance of the PD84008L-E LDMOS RF power transistor.



Mechanical specification:
L = 60 mm, W = 30 mm

Table 1. Device summary

Order code
STEVAL-TDR020V1

Contents

1 Electrical characteristics 3

2 Impedance 4

3 Typical performance 5

4 Test circuit 7

5 Circuit photo 9

6 Revision history 10

1 Electrical characteristics

T_A = +25 °C, V_{DD} = 7.2 V, I_{dq} = 200 mA

Table 2. Electrical specification

Symbol	Test conditions	Min	Typ	Max	Unit
Freq	Frequency range	740		950	MHz
P_{OUT}			4		W
Gain	@ P_{IN} = 24 dBm		12.3 ±0.3		dB
ND	@ P_{IN} = 24 dBm		50 - 57		%
H2	2^{ND} Harmonic @ P_{IN} = 24 dBm		-48 / -65		dBc
H3	3^{RD} Harmonic @ P_{IN} = 24 dBm		-64 / -70		dBc
VSWR	Load mismatch all phases @ P_{OUT} = 4 W		20:1		

2 Impedance

Figure 1. Impedance graphic

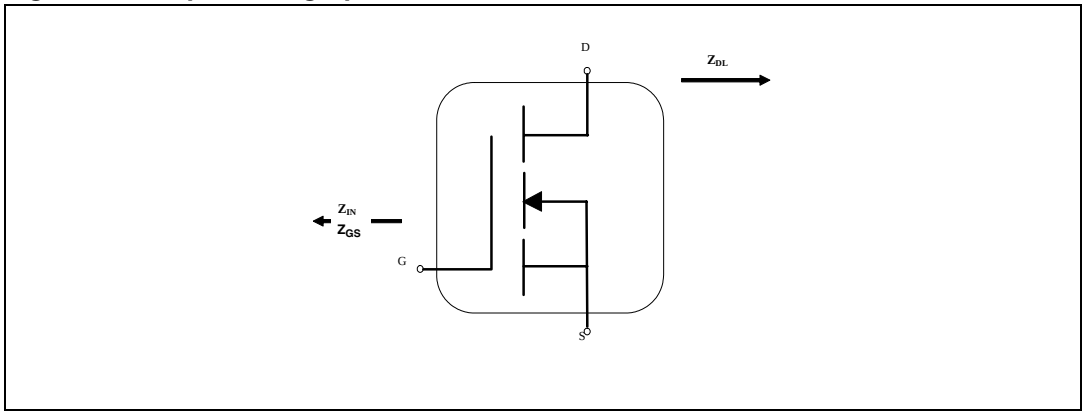


Table 3. Impedance data

F(MHz)	Z_{GS}	Z_{DL}
740	2,52 + j1,42	3,06 + j0,41
750	2,52 + j1,56	3,09 + j0,51
760	2,51 + j1,73	3,12 + j0,64
770	2,46 + j1,84	3,13 + j0,72
780	2,47 + j1,96	3,13 + j0,81
790	2,48 + j2,07	3,13 + j0,87
800	2,45 + j2,22	3,14 + j0,96
810	2,44 + j2,27	3,08 + j1,02
820	2,45 + 2,43	3,05 + j1,04
830	2,41 + j2,57	3,04 + j1,11
840	2,40 + j2,67	2,98 + j1,14
850	2,41 + j2,80	2,99 + j1,24
860	2,38 + j2,92	2,91 + j1,29
870	2,37 + j3,06	2,88 + j1,38
880	2,36 + j3,20	2,81 + j1,40
890	2,37 + j3,25	2,70 + j1,47
900	2,31 + j3,36	2,56 + j1,53
910	2,25 + j3,49	2,50 + j1,62
920	2,16 + j3,57	2,31 + j1,72
930	2,16 + j3,66	2,21 + j1,82
940	2,11 + j3,78	2,11 + j1,96
950	2,06 + j3,86	1,98 + j2,07

3 Typical performance

Figure 2. Output power and efficiency vs frequency Vdd = 7.2 V, Idq = 200 mA, Pin = 24 dBm

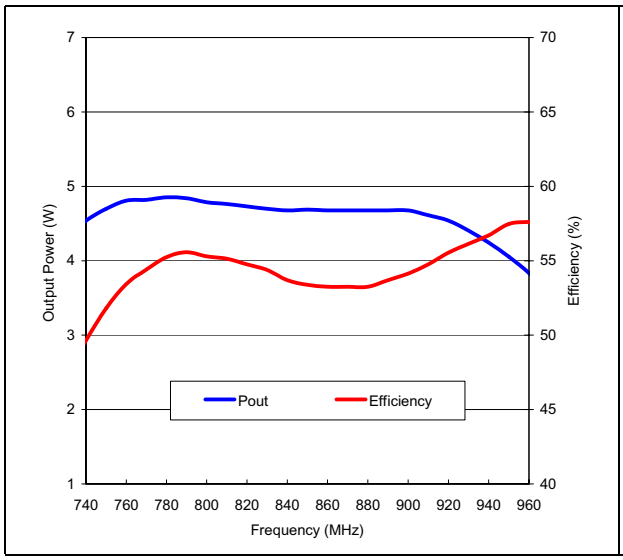


Figure 3. Gain vs output power Vdd = 7.2 V, Idq = 200 mA

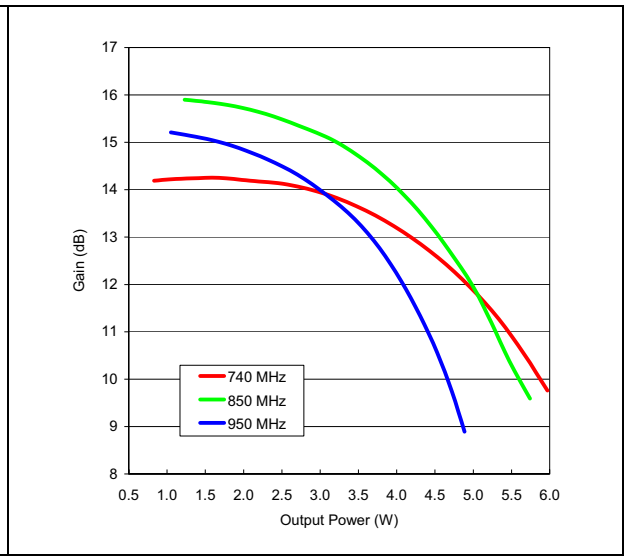


Figure 4. Input return loss vs frequency Vdd = 7. 2 V, Idq = 200 mA

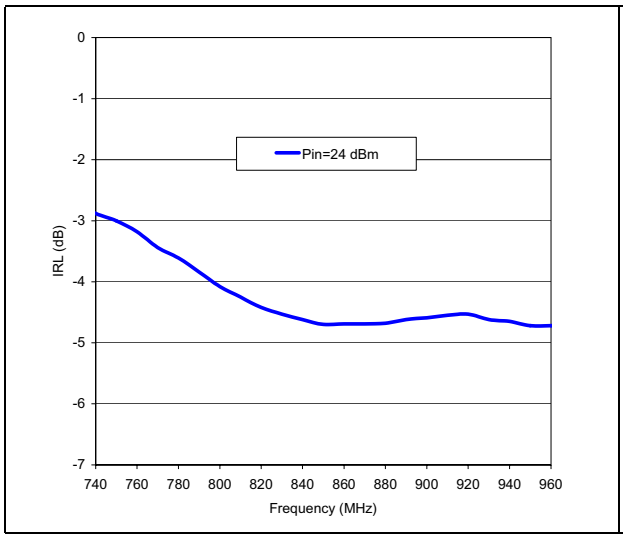


Figure 5. Harmonics vs frequency Vdd = 7.2 V, Idq = 200 mA, Pin = 24 dBm

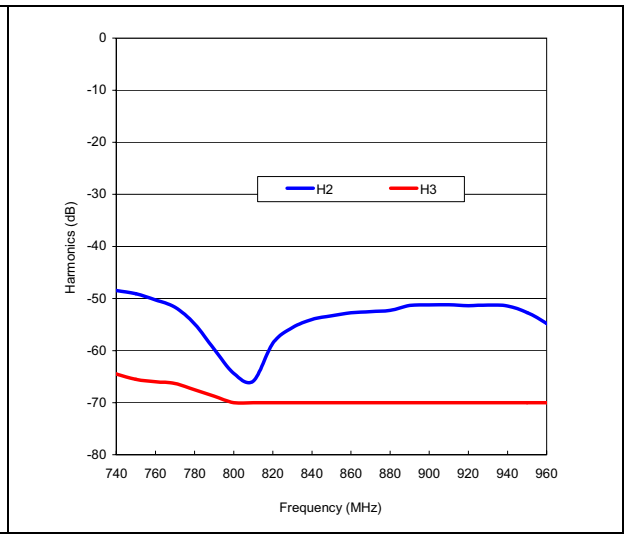
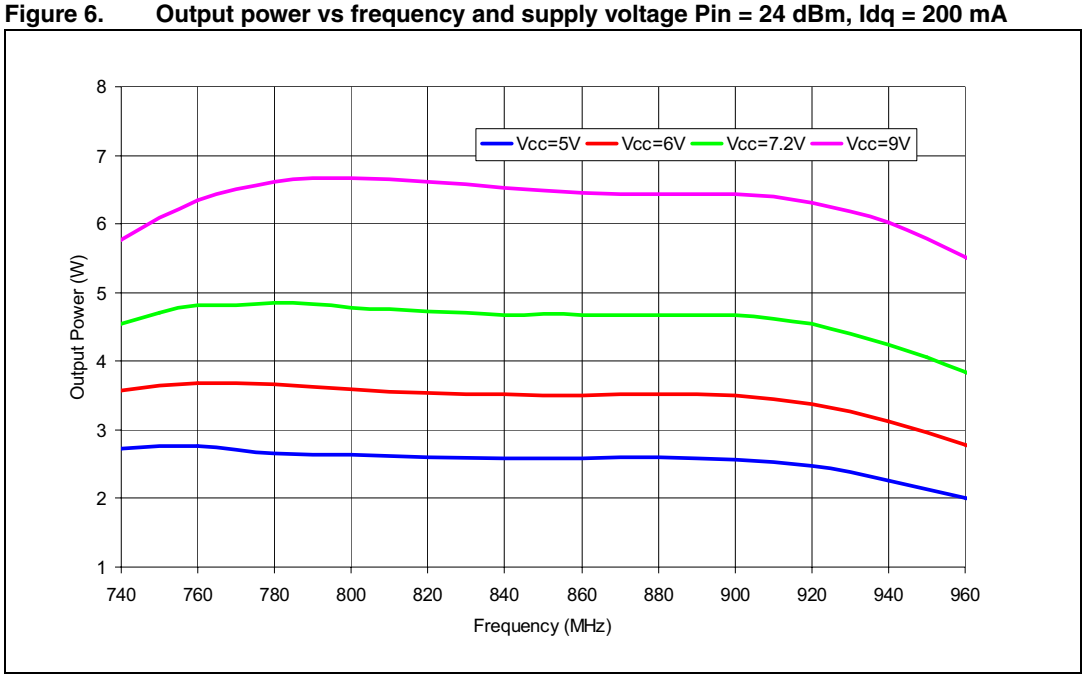


Figure 6. Output power vs frequency and supply voltage Pin = 24 dBm, Idq = 200 mA



4 Test circuit

Figure 7. Test circuit schematic

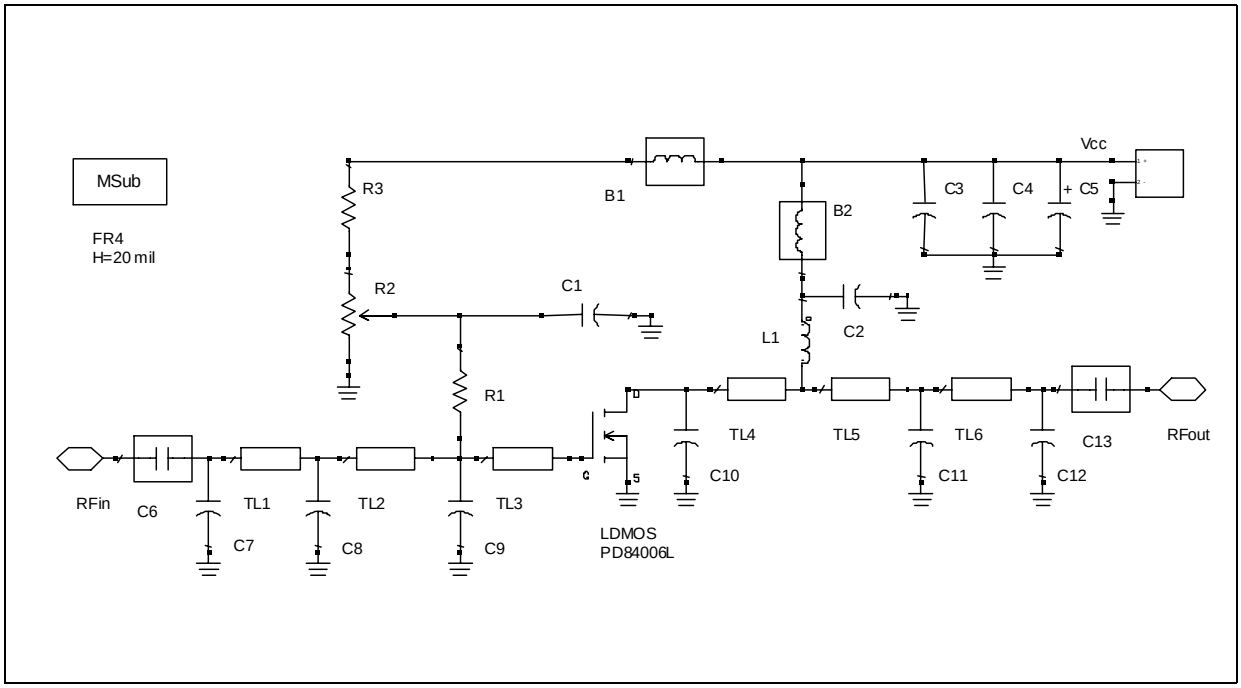
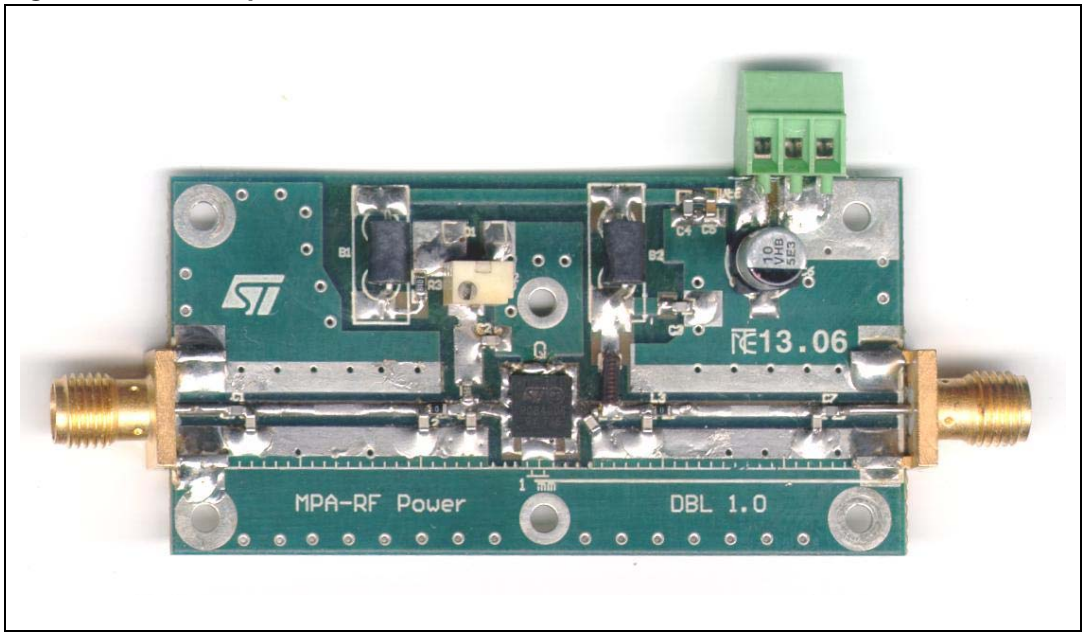


Table 4. Component list

Component ID	Description	Value	Case size	Manufacturer	Part code
B1, B2	Ferrite Bead			Panasonic	EXCELDRC35C
C1, C2	Capacitor	150 pF	0603	MURATA	GRM39-C0G151J50D500
C3	Capacitor	1 nF	0603	MURATA	GRM39-COG102J50D500
C4	Capacitor	10 nF	0603	MURATA	GRM39-X7R103K50C560_
C5	Capacitor	10 uF	SMT	Panasonic	EEVHB1V100P
C6, C13	Capacitor	39 pF	0603	MURATA	GRM39-C0G390J50D500
C7	Capacitor	3,3 pF	0603	MURATA	GQM1885C2A3R3C
C8	Capacitor	8,2 pF	0603	MURATA	GQM1885C1H8R2D
C9	Capacitor	18 pF	0603	MURATA	GQM1885C1H180J
C10	Capacitor	15 pF	0603	MURATA	GQM1885C1H150J
C11	Capacitor	12 pF	0603	MURATA	GQM1885C1H120J
C12	Capacitor	4,7 pF	0603	MURATA	GQM1885C2A4R7
L1	Inductor	12.55 nH		Coilcraft	1606-10
R1	Resistor	56 Ω	0603	Tyco Electronics	
R2	Potentiometer	10 KΩ		Bourns Electronics	3214W-1-103E
R3	Resistor	1 K	0603	Tyco Electronics	01623440-1
TL1	Transmission line	W=0.92 mm	L= 13,50 mm		
TL2	Transmission line	W=0.92 mm	L= 3,15 mm		
TL3	Transmission line	W=0.92 mm	L= 2,90 mm		
TL4	Transmission line	W=0.92 mm	L= 2,00 mm		
TL5	Transmission line	W=0.92 mm	L= 2,20 mm		
TL6	Transmission line	W=0.92 mm	L= 13,20 mm		
RF in, RF out	SMA-CONN	50 Ω	60 mils	JOHNSON	142-0701-801
PD84006L-E	LDMOS			STMicroelectronics	PD84006L-E
Board	FR-4 THk=0.020" 2OZ Cu both sides				

5 Circuit photo

Figure 8. Circuit photo



6 Revision history

Table 5. Document revision history

Date	Revision	Changes
18-Oct-2010	1	Initial release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com